

CLAIMS

1. A transparent film of which $Re(\lambda)$ and $Rth(\lambda)$ defined by following formulae (I) and (II) satisfy following formulae (III) and (IV):

$$(I) \quad Re(\lambda) = (n_x - n_y) \times d,$$

$$(II) \quad Rth(\lambda) = \{ (n_x + n_y)/2 - n_z \} \times d,$$

$$(III) \quad 0 \leq |Re(630)| \leq 50,$$

$$(IV) \quad Rth(400) \times Rth(700) \leq 0, \text{ and } 0 \leq |Rth(700) - Rth(400)| \leq 150,$$

wherein $Re(\lambda)$ means an in-plane retardation value at a wavelength λ nm (unit: nm); $Rth(\lambda)$ means a thickness-direction retardation value at a wavelength λ nm (unit: nm); n_x means a refractive index in the in-plane slow-axis direction; n_y means a refractive index in the in-plane fast-axis direction; n_z means a refractive index in the film thickness direction; and d means a thickness of the film.

2. The transparent film of claim 1, which comprises a thermoplastic norbornene resin.

3. The transparent film of claim 1, which comprises a cellulose acylate.

4. The transparent film of claim 3, wherein the cellulose acylate has a degree of acyl substitution of from 2.85 to 3.00.

5. The transparent film of claim 3 or 4, wherein the acyl substituent in the cellulose acylate consists of substantially two selected from an acetyl group, a propionyl group and a butanoyl group; and the degree of total acyl substitution is from 2.50 to 3.00.

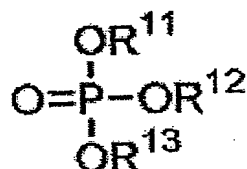
6. The transparent film of claim 1, which comprises at least one compound capable of reducing $Re(\lambda)$ and $Rth(\lambda)$.

7. The transparent film of claim 1, which comprises at least

one compound capable of reducing $\text{Re}(\lambda)$ and $\text{Rth}(\lambda)$ of the film and having an octanol-water partition coefficient ($\text{Log } p$ value) of from 0 to 7, in an amount of from 0.01 to 30 % by weight of the solid content of the film.

8. The transparent film of claim 1, which contains at least one compound of any of the following formulae (1) to (19) capable of reducing $\text{Re}(\lambda)$ and $\text{Rth}(\lambda)$ of the film and having an octanol-water partition coefficient ($\text{Log } p$ value) of from 0 to 7, in an amount of from 0.01 to 30 % by weight of the solid content of the film:

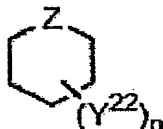
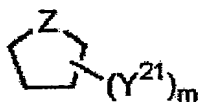
Formula (1)



wherein R^{11} to R^{13} each independently represent a C_{1-20} aliphatic group, and R^{11} to R^{13} may bond to each other to form a ring,

Formula (2)

Formula (3)

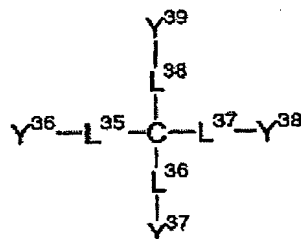
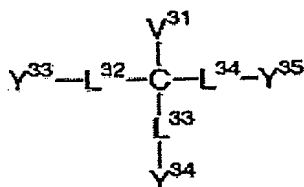
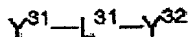


wherein Z represents a carbon atom, an oxygen atom, a sulfur atom, or $-\text{NR}^{25}-$; R^{25} represents a hydrogen atom or an alkyl group; the 5-membered or 6-membered ring including Z may have a substituent; Y^{21} and Y^{22} each independently represent an ester group, an alkoxycarbonyl group, an amido group or a carbamoyl group having from 1 to 20 carbon atoms; Y^{21} and Y^{22} may bond to each other to form a ring; m indicates an integer of from 1 to 5; n indicates an integer of from 1 to 6,

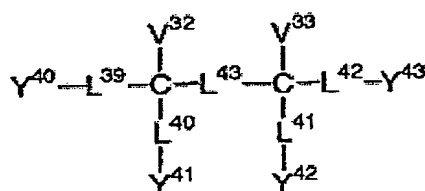
Formula (4)

Formula (5)

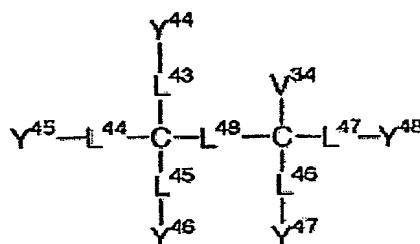
Formula (6)



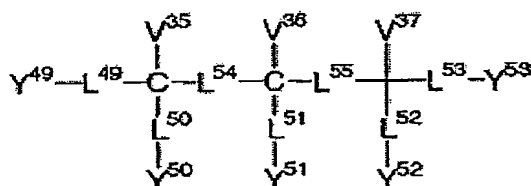
Formula (7)



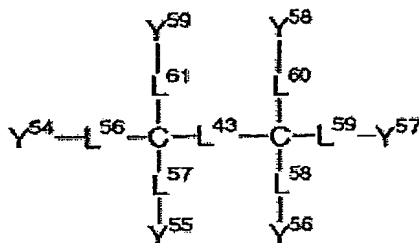
Formula (8)



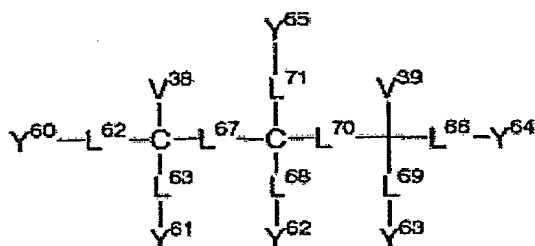
Formula (9)



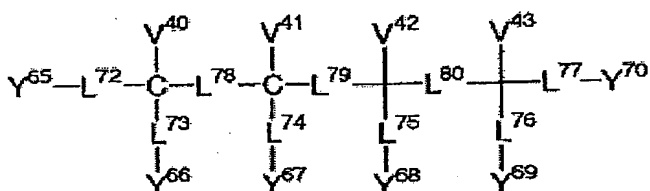
Formula (10)



Formula (11)

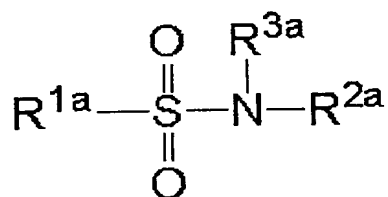


Formula (12)



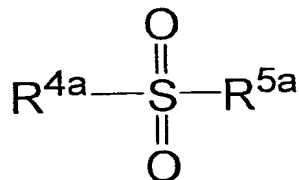
wherein Y³¹ to Y⁷⁰ each independently represent an ester group having from 1 to 20 carbon atoms, an alkoxycarbonyl group having from 1 to 20 carbon atoms, an amido group having from 1 to 20 carbon atoms, a carbamoyl group having from 1 to 20 carbon atoms, or a hydroxyl group; V³¹ to V⁴³ each independently represent a hydrogen atom, or a C₁₋₂₀ aliphatic group; L³¹ to L⁸⁰ each independently represent a divalent saturated linking group having from 0 to 40 atoms and having from 0 to 20 carbon atoms; when the number of the atoms to constitute L³¹ to L⁸⁰ is 0 (zero), it means that the groups at both ends of the linking group directly bond to each other to form a single bond; V³¹ to V⁴³, and L³¹ to L⁸⁰ may have a substituent,

Formula (13)



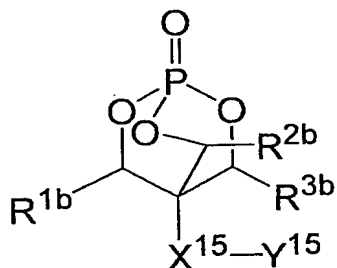
wherein R^{1a} represents an alkyl group or an aryl group; R^{2a} and R^{3a} each independently represent a hydrogen atom, an alkyl group or an aryl group; the number of all carbon atoms of R^{1a} , R^{2a} and R^{3a} is at least 10; and the alkyl group and the aryl group may have a substituent,

Formula (14)



wherein R^{4a} and R^{5a} each independently represent an alkyl group or an aryl group; the number of all carbon atoms of R^{4a} and R^{5a} is at least 10; and the alkyl group and the aryl group may have a substituent,

Formula (15)

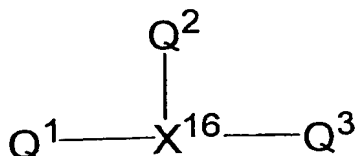


wherein R^{1b} , R^{2b} and R^{3b} each independently represent a hydrogen atom or an alkyl group; X^{15} represents a divalent linking group to be formed of one or more groups selected from the following linking group 1; and Y^{15} represents a hydrogen atom, an alkyl group, an aryl group or an aralkyl group,

Linking Group 1:

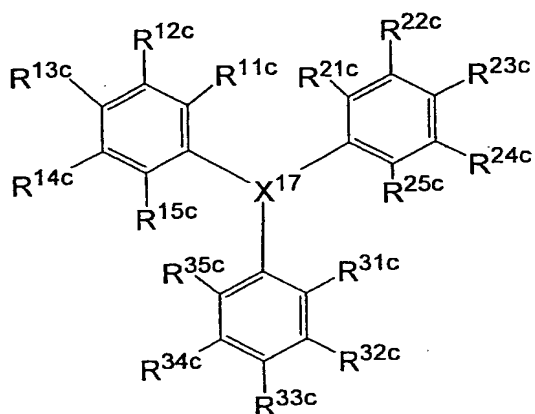
a single bond, $-\text{O}-$, $-\text{CO}-$, $-\text{NR}^{4b}-$, an alkylene group and an arylene group; and R^{4b} is a hydrogen atom, an alkyl group, an aryl group or an aralkyl group,

Formula (16)



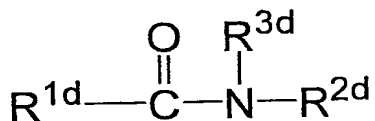
wherein Q^1 , Q^2 and Q^3 each independently represent a 5- or 6-membered ring; and X^{16} represents a boron atom (B), C-R (R is a hydrogen atom or a substituent), a nitrogen atom (N), a phosphorous atom (P) or $\text{P}=\text{O}$,

Formula (17)



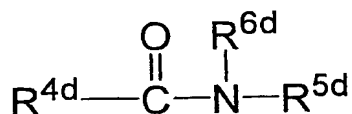
wherein X^{17} represents B, C-R (R is a hydrogen atom or a substituent), or N; and R^{11c} , R^{12c} , R^{13c} , R^{14c} , R^{15c} , R^{21c} , R^{22c} , R^{23c} , R^{24c} , R^{25c} , R^{31c} , R^{32c} , R^{33c} , R^{34c} and R^{35c} each represent a hydrogen atom or a substituent,

Formula (18)



wherein R^{1d} represents an alkyl group or an aryl group; R^{2d} and R^{3d} each independently represent a hydrogen atom, an alkyl group or an aryl group; and the alkyl group and the aryl group may have a substituent,

Formula (19)



wherein R^{4d} , R^{5d} and R^{6d} each independently represent an alkyl group or an aryl group; and the alkyl group and the aryl group may have a substituent.

9. The transparent film of claim 1, which comprises at least one compound capable of lowering $|R_{th}(700) - R_{th}(400)|$ of the film.

10. The transparent film of claim 1, having a thickness of from 10 to 120 μm .

11. An optical compensatory film comprising a transparent film of claim 1 and an optically-anisotropic layer having $R_e(630)$ of from 0 to 200 nm and $|R_{th}(630)|$ of from 0 to 400 nm.

12. A polarizing plate comprising at least one of a transparent film of claim 1 or an optical compensatory film of claim 11, and a polarizer.

13. A liquid-crystal display device, which comprises a transparent film of which $R_e(\lambda)$ and $R_{th}(\lambda)$ defined by the following formulae (I) and (II) satisfy the following formulae (III) and (IV):

$$(I) R_e(\lambda) = (n_x - n_y) \times d,$$

$$(II) R_{th}(\lambda) = \{ (n_x + n_y)/2 - n_z \} \times d,$$

$$(III) 0 \leq |R_e(630)| \leq 50,$$

$$(IV) R_{th}(400) \times R_{th}(700) \leq 0, \text{ and } 0 \leq |R_{th}(700) - R_{th}(400)| \leq 150,$$

wherein $R_e(\lambda)$ means an in-plane retardation value at a wavelength λ nm (unit: nm); $R_{th}(\lambda)$ means a thickness-direction retardation value at a wavelength λ nm (unit: nm); n_x means a refractive index in the in-plane slow-axis direction; n_y means a refractive index in the in-plane fast-axis direction; n_z means a refractive index in the film thickness direction; and d means a thickness of the film.

14. A liquid-crystal display device comprising a liquid-crystal cell, which has a pair of substrates disposed to face each other and having an electrode on at least one of them, and a liquid-crystal layer sandwiched between the pair of substrates and comprising a nematic liquid-crystal material, wherein the liquid-crystal molecules of the nematic liquid-crystal material are aligned substantially in parallel to the surface of the pair

of substrates in a black state and wherein the product of the thickness d (μm) and the refractivity anisotropy Δn , $\Delta n \cdot d$, of the liquid-crystal layer falls within the range from 0.2 and 1.0 μm , first and second polarizing films disposed to sandwich the liquid-crystal cell between them, and a transparent film is disposed between at least one of the first and second polarizing films and the liquid-crystal cell,

wherein $\text{Re}(\lambda)$ and $\text{Rth}(\lambda)$ of the transparent film, as defined by the following formulae (I) and (II), satisfy the following formulae (III) and (IV):

$$(I) \text{Re}(\lambda) = (n_x - n_y) \times d,$$

$$(II) \text{Rth}(\lambda) = \{ (n_x + n_y)/2 - n_z \} \times d,$$

$$(III) 0 \leq |\text{Re}(630)| \leq 50,$$

$$(IV) \text{Rth}(400) \times \text{Rth}(700) \leq 0, \text{ and } 0 \leq |\text{Rth}(700) - \text{Rth}(400)| \leq 150,$$

wherein $\text{Re}(\lambda)$ means an in-plane retardation value at a wavelength λ nm (unit: nm); $\text{Rth}(\lambda)$ means a thickness-direction retardation value at a wavelength λ nm (unit: nm); n_x means a refractive index in the in-plane slow-axis direction; n_y means a refractive index in the in-plane fast-axis direction; n_z means a refractive index in the film thickness direction; and d means a thickness of the film.

15. The liquid-crystal display device of claim 14, further comprising first and second optical compensatory films,

wherein the first polarizing film, the second optical compensatory film, the first optical compensatory film, the liquid-crystal cell, the transparent film and the second polarizing film are disposed in this order, Re of the second optical compensatory film is not greater than 100 nm and the thickness-direction retardation Rth thereof is not greater than 200 nm, the refractivity anisotropy of the first optical compensatory film is negative and the optical axis thereof is substantially in parallel to the layer face, the slow axis of the first optical compensatory film is parallel to the transmission axis of the first polarizing film and to the slow axis direction of the liquid-crystal cell in a black display, and Re of the first optical compensatory film falls within the range from 50 nm to 400 nm.

16. The liquid-crystal display device of claim 15, wherein at least one of the first optical compensatory film and the second optical compensatory film comprises at least one discotic liquid-crystal compound.

17. The liquid-crystal display device of claim 14 further comprising first and second optical compensatory film,

wherein the first polarizing film, the second optical compensatory film, the first optical compensatory film, the liquid-crystal cell, the transparent film and the second polarizing film are disposed in this order, R_e of the second optical compensatory film is not greater than 100 nm and the thickness-direction retardation R_{th} thereof is not greater than 200 nm, R_e of the first optical compensatory film falls within the range from 100 nm to 300 nm, and N_z of the first optical compensatory film, defined as $N_z = (n_x - n_z)/(n_x - n_y)$, falls within the range from 0.2 to 0.8 where n_x and n_y are the in-plane refractive index of the film ($n_x \geq n_y$), n_z is the thickness-direction refractive index of the film, and d is the thickness of the film.

18. The liquid-crystal display device of claim 17, wherein at least one of the first optical compensatory film and the second optical compensatory film is a biaxially-stretched film.